

CLAIMS

It is claimed:

1. An image sensor unit comprising

a first photoconverter comprising a first array of first light receiving elements, the first photoconverter for photoelectrically converting light of a first light quality from a source image for outputting first signals by photoelectric conversion, the first signals having a first image quality

a second photoconverter comprising a second array of second light receiving elements, the second photoconverter for photoelectrically converting light of a second light quality from the source image for outputting second signals by photoelectric conversion, the second signals having a second image quality, wherein the second image quality is better than the first image quality

a signal correction unit to
produce first enhanced signals corresponding to the first light quality from the source image
use the second signals to modify the first signals to produce the first enhanced signals.

2. The image sensor unit of claim 1 wherein

the first photoconverter is a color photoconverter

the second photoconverter is a monochrome photoconverter.

3. The image sensor unit of claim 1 wherein

the first light quality comprises a first color

the second light quality comprises black and white

the image sensor comprises a third photoconverter comprising a third array of third light receiving elements, the third photoconverter for photoelectrically converting light of a third light quality from the source image for outputting third signals by photoelectric conversion, the third light quality comprising a second color different from the first color

the image sensor comprises a fourth photoconverter comprising a fourth array of fourth light receiving elements, the fourth photoconverter for photoelectrically converting light of a fourth light quality from the source image for outputting fourth signals by photoelectric conversion, the fourth light quality comprising a third color different from the first color and the second color

the signal correction unit further to

produce second enhanced signals corresponding to the third light quality from the source image

produce third enhanced signals corresponding to the fourth light quality from the source image

use the second signals to modify the third signals to produce the second enhanced signals

use the second signals to modify the fourth signals to produce the third enhanced signals.

4. An image reading apparatus including the image sensor unit of claim 3 and further having a color mode, wherein the image sensor outputs color signals and monochrome signals.
5. The image reading apparatus of claim 4 wherein the signal correction unit is further for improving the color signals' gradation.
6. The image reading apparatus of claim 4 wherein the color signals are signals of three primary colors and the signal correction unit is for converting the three primary color signals and the monochrome signals to data indicating color characteristics.
7. A process for producing image signals comprising
 - providing a first photoconverter comprising a first array of first light receiving elements
 - providing a second photoconverter comprising a second array of second light receiving elements
 - the first photoconverter photoelectrically converting light of a first light quality from a source image
 - the second photoconverter photoelectrically converting light of a second light quality from the source image
 - outputting first signals from the first photoconverter having a first quality of a characteristic
 - outputting second signals from the second photoconverter having a second quality of the characteristics better than the first quality

enhancing the first quality using the second signals.

8. The process for producing image signals of claim 7 wherein

the first photoconverter is a color photoconverter

the second photoconverter is a monochrome photoconverter.

9. The process for producing image signals of claim 7 wherein the first light quality comprises a first color and the second light quality comprises black and white, the process further comprising

providing a third photoconverter comprising a third array of third light receiving elements

providing a fourth photoconverter comprising a fourth array of fourth light receiving elements

the third photoconverter photoelectrically converting light of a third light quality from the source image, the third light quality comprising a second color different from the first color

the fourth photoconverter photoelectrically converting light of a fourth light quality from the source image, the fourth light quality comprising a third color different from the first color and the second color

outputting third signals from the third photoconverter having a third quality of the characteristic

outputting fourth signals from the fourth photoconverter having a fourth quality of the characteristic

enhancing the third quality using the second signals

enhancing the fourth quality using the second signals.

10. The process for producing image signals of claim 7, wherein the first signals are color signals and the second signals are monochrome signals.

11. The process for producing image signals of claim 9 wherein the characteristic comprises resolution.

12. The process for producing image signals of claim 9 wherein the characteristics comprises gradation.

13. A process for producing image signals comprising
receiving a first color image signal for a first color
receiving a second color image signal for a second color
receiving a third color image signal for a third color
receiving monochrome image signals for black and white
improving a quality of at least one of the first, second and third color signals using
information in the monochrome signals.

14. The process for producing image signals of claim 13 wherein the first color is red, the second color is green and the third color is blue.

15. The process for producing image signals of claim 13 comprising improving the quality
by

obtaining brightness signals from the monochrome image signals

obtaining a first color difference signal from the first, second and third color image signals

obtaining a second color difference signal from the first, second and third color image signals

obtaining enhanced first color image signals from the brightness signals and the first color difference signals

obtaining enhanced second color image signals from the brightness signals, the first color difference signals and the second color difference signals

obtaining enhanced third color image signals from the brightness signals and the first color difference signals.

16. The process for producing image signals of claim 13 wherein the enhanced first, second and third color image signals have improved resolution over the first, second and third color image signals.

17. The process for producing image signals of claim 13 wherein the enhanced first, second and third color image signals have improved gradation over the first, second and third color image signals.

18. A color signal processing circuit for processing plural channels of input color signals using input monochrome signals, wherein the channels of input color signals represent respective numbers of respective color pixels and the input monochrome signals represent a

number of monochrome pixels, wherein the number of monochrome pixels is larger than the number of color pixels of at least one of the channels of input color signals, the color signal processing circuit comprising

a first circuit to produce brightness signals, first color difference signals and second color difference signals from the input color signals and the input monochrome signals

a second circuit to use the brightness signal, the first color difference signal and the second color difference signal to obtain output color signals corresponding to at least one of the channels, wherein the output color signals represent a number of pixels greater than the number of pixels in the corresponding channel of input color signals.

19. The color signal processing circuit of claim 18 wherein

the numbers are counted in a first dimension

the input color signals and the input monochrome signals represent a same number of pixels in a second dimension.

20. The color signal processing circuit of claim 18 wherein the numbers are counted in two dimensions.

21. The color signal processing circuit of claim 18 wherein the first circuit is to produce the first color difference signals and the second color difference signals from the input color signals and without the input monochrome signals.

22. The color signal processing circuit of claim 18 wherein there are three channels of input color signals representing three primary colors.

23. The color signal processing circuit of claim 22 wherein
the channels of input color signals represent different numbers of pixels
the different numbers less than the second number.
24. The color signal processing circuit of claim 22 wherein
the channels of input color signals represent a same numbers of pixels
the second circuit is to obtain output color signals of the three channels.
25. An image reading apparatus comprising the color signal processing circuit of claim
18.